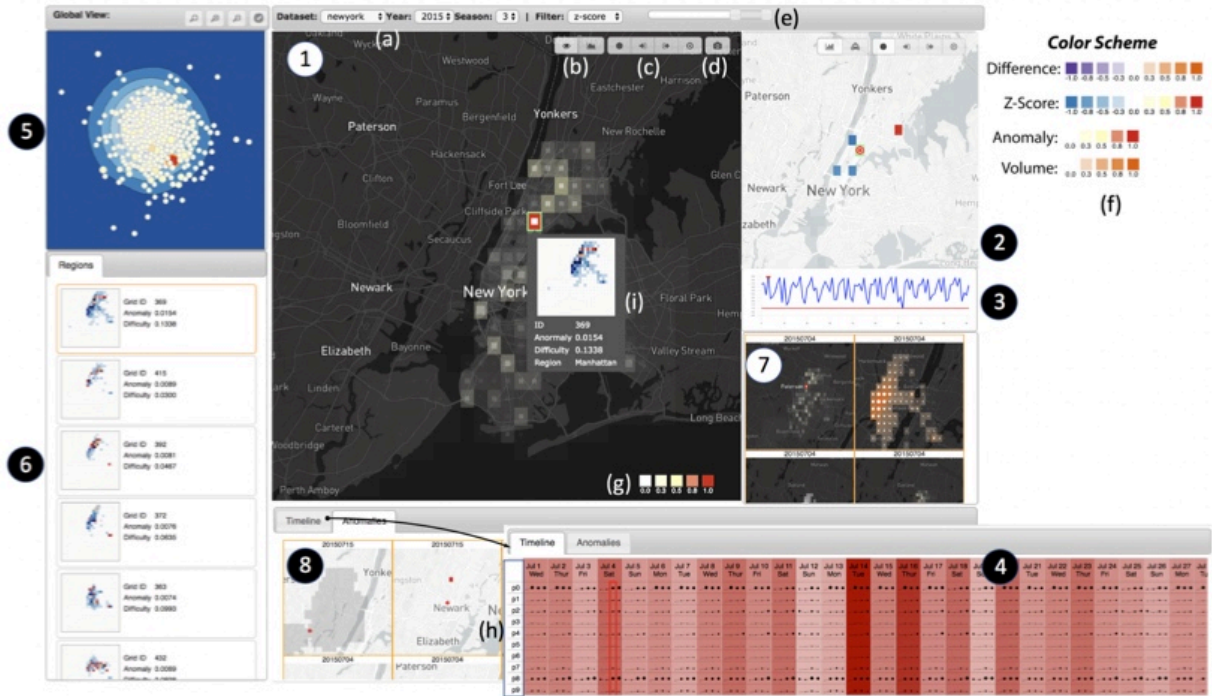


# Voila: Visual Anomaly Detection and Monitoring with Streaming Spatiotemporal Data



# 发表

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## 摘要

- **数据:** spatiotemporal data 时空数据的异常检测
- **现有的解决方案:** 限制在大型, 动态, 混合数据中识别异常
- **需求:** online monitoring and interactivity 在线检测和交互

## 挑战与需求

和专家讨论得到

1. 适应性Adaptivity-----在线检测与分析Online monitoring and analysis.
2. 可解释性Interpretability----Multifaceted pattern discovery and anomaly filtering

### 3. 交互性Interactivity-----Human in the analysis loop

## 贡献

1. 系统，满足三个挑战
2. 算法，基于张量的异常检测
3. 可视化交互 Visualization and Interaction,基于张量的异常检测算法，适用于动态输入数据以及展示pattern的spatiotemporal context，同时结合Bayesian approach去分析

## 相关工作

1. Anomaly Detection Algorithms
2. Visual Anomaly Detection
3. Visualizing the Spatiotemporal Data

## 系统

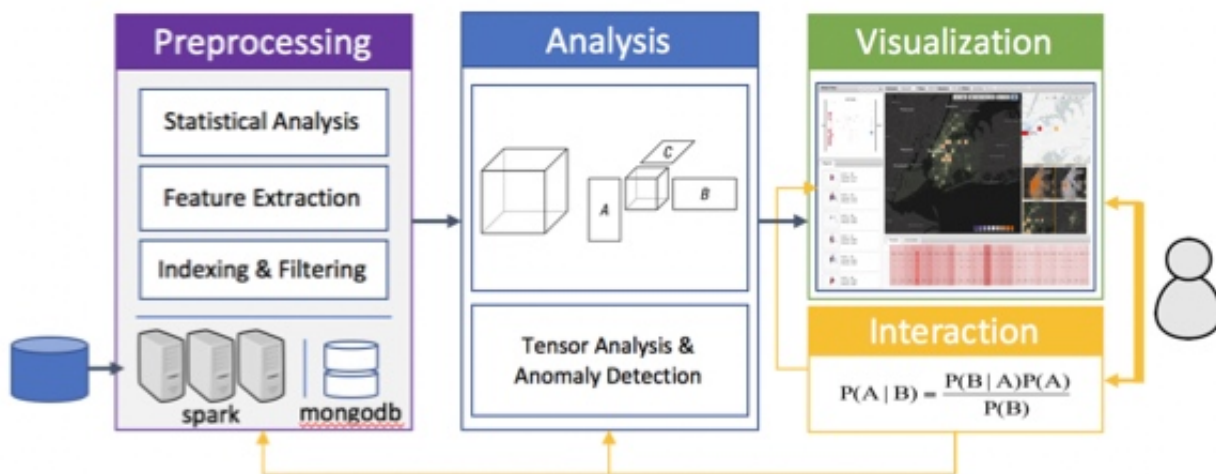


Fig. 2. The system architecture.

1. the data preprocessing module,
2. the analysis module,
3. the visualization module,
4. the interaction module

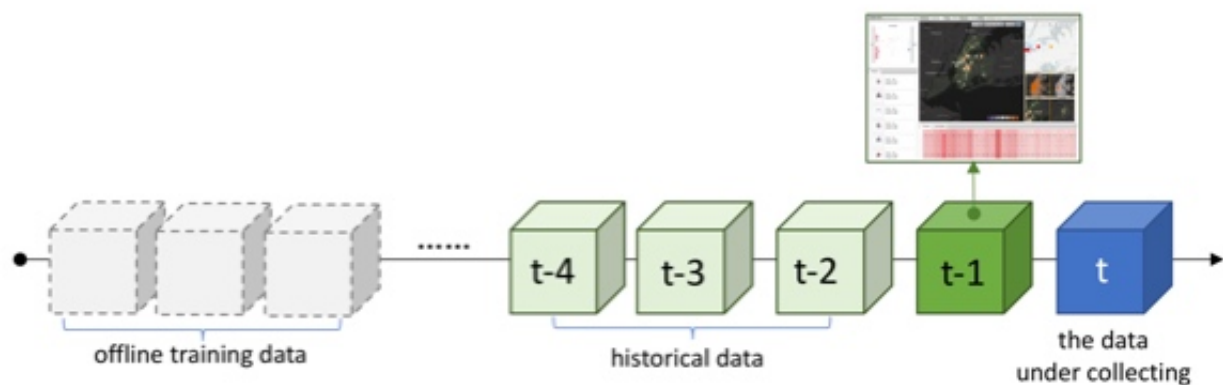


Fig. 3. The system pipeline for data processing and analysis.

## 异常检测算法

1. local outlier factor (LOF) 这篇中用LOF更好
2. One-Class SVM

## 数据集

New York City taxi-trip  
various sources (e.g. taxi trips, traffic sensors, etc.)

## 可视化方法

Anomaly glyph.  
small multiple charts

## 评估

Baseline methods and evaluation metrics

1. Case Study
2. Domain Expert Interview

## 算法

1. LOF
2. One-Class SVM

## metrics

1. precision
2. recall
3. ROC

## 未来工作

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1. providing tacit tutorials to guide the novice users
2. offering visual clues about low-precision instances in the anomaly ranking list
3. supporting fact search and checking
4. adaptively determining the temporal granularity,
5. developing new algorithms with forecasting and prediction capability.